

Robert Y. Lewis

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EMPLOYMENT

- 2021 – Present **Brown University**, Providence, RI, USA
Lecturer, Computer Science
- 2018 – 2021 **Vrije Universiteit Amsterdam**, The Netherlands
Postdoc, Theoretical Computer Science
- Summer 2016 **Wolfram Research**, Champaign, IL, USA
Intern, Mathematica Algorithms R&D
- 2010 – 2012 **St. Agnes Academy**, Houston, TX, USA
Secondary School Teacher
10th grade geometry, 11th and 12th grade pre-calculus, 12th grade AP Calculus AB

EDUCATION

- 2012 – 2018 **Carnegie Mellon University**, Pittsburgh, PA, USA
PhD, Pure and Applied Logic, 2018
MS, Mathematics, 2015
MS, Logic, Computation, and Methodology, 2014
- Summer 2015 **University of Newcastle**, NSW, Australia
Visiting student, [CARMA](#) Priority Research Centre
- 2006 – 2010 **Rice University**, Houston, TX, USA
BA, Mathematics and Philosophy

PEER REVIEWED PUBLICATIONS

Formalized functional analysis with semilinear maps (journal version)

Frédéric Dupuis, Robert Y. Lewis, and Heather Macbeth
Journal of Automated Reasoning 68, 2024.

Formalized functional analysis with semilinear maps

Frédéric Dupuis, Robert Y. Lewis, and Heather Macbeth
Interactive Theorem Proving (ITP 2022)

A bi-directional extensible interface between Lean and Mathematica

Robert Y. Lewis and Minchao Wu
Journal of Automated Reasoning 66(1), 2022

Formalizing the ring of Witt vectors

Johan Commelin and Robert Y. Lewis

10th ACM SIGPLAN International Conference on Certified Programs and Proofs (CPP 2021)

Normalizing casts and coercions

Robert Y. Lewis and Paul-Nicolas Madelaine

Practical Aspects of Automated Reasoning (PAAR 2020)

Maintaining a library of formal mathematics

Floris van Doorn, Gabriel Ebner, and Robert Y. Lewis

13th Conference on Intelligent Computer Mathematics (CICM 2020)

The Lean mathematical library

The mathlib Community

9th ACM SIGPLAN International Conference on Certified Programs and Proofs (CPP 2020), pp. 367-381. 2020

This paper describes a collective project with many contributors. I am a maintainer of the project and wrote much of this paper.

Formalizing the solution to the cap set problem

Sander Dahmen, Johannes Hölzl, and Robert Y. Lewis

Interactive Theorem Proving (ITP 2019)

A formal proof of Hensel's lemma over the p -adic integers

Robert Y. Lewis

8th ACM SIGPLAN International Conference on Certified Programs and Proofs (CPP 2019)

An extensible ad hoc interface between Lean and Mathematica

Robert Y. Lewis

Proof eXchange for Theorem Proving 2017 (EPTCS)

A heuristic prover for real inequalities (journal version)

Jeremy Avigad, Robert Y. Lewis, and Cody Roux

Journal of Automated Reasoning 56(3), pp. 367-386. 2016

A heuristic prover for real inequalities

Jeremy Avigad, Robert Y. Lewis, and Cody Roux

Interactive Theorem Proving (ITP 2014)

Energy-minimizing unit vector fields

Leobardo Rosales, Robert Y. Lewis, et al

Involve 3(4), pp. 435-450. 2010

OTHER PUBLICATIONS

The art of formal proof

Robert Y. Lewis

Math Horizons 32(2), pp. 20-23. 2024

Logic and Proof (a textbook using the Lean theorem prover)

Jeremy Avigad, Robert Y. Lewis, and Floris van Doorn

Available freely in [interactive](#) and [static](#) versions

Classification of one-dimensional isocrystals (blog post)

Robert Y. Lewis and Heather Macbeth

[Featured on the leanprover-community blog](#)

Two Tools for Formalizing Mathematical Proofs (dissertation)

Robert Y. Lewis

Certified Feb 16, 2018

Polya: A Heuristic Procedure for Reasoning with Real Inequalities (MSc thesis)

Robert Y. Lewis

Certified Dec 11, 2014

TEACHING

Brown:

CS0220: Discrete Structures and Probability: S25, S24, S23, S22

CS1951x: Formal Proof and Verification: F24, F23, F22, F21

CS1260: Compilers and Program Analysis: F24, F23, F22

CS1970: Independent Study on Homotopy Type Theory: S24

CS1970: Independent Study on Formal Theorem Proving: S22

CS0112: Computing Foundations: Program Organization: F21

VU Amsterdam:

Logic and Modeling: S21 (online), S20 (online), S19, S18 (teaching assistant)

Introduction to Computer Science (theory week): F20 (online)

Carnegie Mellon:

80-211: Logic and Mathematical Inquiry: F16

80-110: Nature of Mathematical Reasoning: S15, Su14

21-257: Models and Methods of Optimization: F14 (teaching assistant)

80-311: Undecidability and Incompleteness: S14 (grader)

80-610: Formal Logic: F13 (grader)

Previous:

Geometry, Pre-calculus, AP Calculus AB: St. Agnes Academy, 2010-2012

Honors Calculus III/IV, Honors Linear Algebra: Rice, 2007-2010 (grader)

STUDENT SUPERVISION

Brown, PhD:

2024 – Eric Zhao

Brown, MSc thesis:

2023 Jakob Kreuze

2022 – 2023 Benjamin Ryjikov

Brown, BSc honors thesis:

2024 Shreyas Mishra (second reader)

2023 – 2024 Jiahua Chen

2023 – 2024 Joseph Rotella

2022 Mark Lavrentyev

Brown, research assistant:

2024 Aren Guralp

2024 Sophie Ljung

2023 Luke West

VU Amsterdam:

2021 Polina Boneva (BSc thesis)

2019 Kevin Kappelmann (MSc intern)

2019 Paul-Nicolas Madelaine (MSc intern)

2018 – 2019 Markos Dermitzakis (BSc thesis)

2018 – 2019 Phillip Lippe (MSc research assistant)

2018 – 2019 Miko Kuijn (MSc thesis)

2018 Pablo Le Hénaff (MSc intern)

AWARDS, GRANTS, AND HONORS

- 2024 NSF FMITF Track III: *Proof assistants in discrete mathematics education*
- 2022 NSF SHF Small: *Misconceptions in Understanding Logics and Formal Properties* (co-PI)
- 2022 Microsoft Research curriculum development grant
- 2021 Lorentz Center, hosting and organization for 45 person workshop
- 2020 Microsoft Research on Azure grant
- 2019 – 2023 Senior Collaborator, [Lean Forward](#) NWO Vidi grant
- 2017 [Laboratory of Symbolic and Educational Computation](#) research fellowship
- 2017 [Future Faculty](#), Eberly Center for Teaching Excellence & Educational Innovation
- 2015 – 2016 William S. Dietrich II [Presidential PhD Fellowship](#)
- 2014 Honorable Mention, NSF Graduate Research Fellowship Program

SERVICE

- 2024 [Certified Programs and Proofs 2025](#) conference program committee
- 2024 – Founder and managing editor, *Annals of Formalized Mathematics*
- 2024 [Interactive Theorem Proving](#) conference program committee
- 2024 Brown CS MSc admissions committee
- 2024 Organizer, [Lean Together 2024](#) workshop
- 2023 – Founding member, Lean Prover Community admin team
- 2023 [Formal Mathematics for Mathematicians](#) workshop program committee
- 2023 Organizer, [Machine-Checked Mathematics](#) workshop
- 2022 Organizer, [Machine-Checked Mathematics](#) (online) workshop
- 2022 [SC²](#) workshop program committee
- 2022 [Intelligent Computer Mathematics](#) conference program committee
- 2021 Organizer, [Lean Together 2021](#) workshop
- 2020 Proposal assessor, [NWO Open Domain Science – XS](#) scheme
- 2020 [Certified Programs and Proofs 2021](#) conference program committee
- 2020 Organizer, [Formal Methods in Mathematics / Lean Together 2020](#) workshop
- 2019 – Maintainer, Lean [mathlib](#) library
- 2019 Organizer, [Lean Together 2019](#) workshop
- 2018 Organizer, ICMS session on [Formal and Informal Mathematical Corpora](#)
- 2018 [Artificial Intelligence and Symbolic Computation](#) conference program committee
- 2015, 2016 CMU Philosophy Dept. graduate admissions committee
- 2015 CMU Philosophy Dept. 30th Anniversary Conference planning committee
- 2014 – 2018 Founding member, CMU chapter of [Minorities and Philosophy](#)
- 2013 – 2017 Organizer, CMU Philosophy Dept. Graduate Research Sharing Forum
- 2011 – 2012 Coach and sponsor, St. Agnes Academy Engineering/Robotics Team
- 2008 – 2010 Coordinator and tutor, SRC Society of Academic Fellows, Rice University

SELECTED PRESENTATIONS

The “what” and “why” of formal proof

- Brown University Dept of Mathematics seminar, Providence, RI, USA. 04/2024.

Teaching Lean vs. teaching with Lean

- Hausdorff Institute of Mathematics, Bonn, Germany. 06/2024.
- [Learning Mathematics with Lean](#), virtual. 05/2023.
- Rutgers University Lean seminar, New Brunswick, NJ, USA. 05/2023.

The formal language of mathematics

- [SUMS 2023](#), Providence, RI, USA. 03/2023.

Teaching the theory and practice of proof assistants with Lean

- [Formal Methods in Education tutorial series](#), virtual. 08/2022.

Computer algebra and automation in Lean's mathematics library (invited talk)

- [Satisfiability Checking and Symbolic Computation](#), Haifa, Israel. 08/2022.

Software development meets math: Lean and its mathematical library

- [Boston University POPV seminar](#), Boston, MA, USA. 05/2022.

Metaprogramming and tactic writing and Dealing with numbers

- [Lean for the Curious Mathematician](#), virtual. 07/2020.

Simplifying casts and coercions

- [PAAR 2020: Practical Aspects of Automated Reasoning](#), virtual. 06/2020.

The Lean mathematical library

- [CPP 2020: Certified Programs and Proofs](#), New Orleans, LA, USA. 01/2020.

Formalizing the solution to the cap set problem

- [ITP 2019: Interactive Theorem Proving](#), Portland, OR, USA. 09/2019.
- [Vietnam-USA Joint Mathematical Meeting](#), Quy Nhon, Vietnam. 06/2019.
- [CARMA Workshop on Computer-Aided Proof](#), Newcastle, NSW, Australia. 06/2019. (Invited speaker.)

A formal proof of Hensel's lemma over the p -adic integers

- [CPP 2019: Certified Programs and Proofs](#), Cascais, Portugal. 01/2019.
- [Lean Together 2019](#), Amsterdam, The Netherlands. 01/2019.

A heuristic method for formally verifying real inequalities

- [Matryoshka 2018](#), Amsterdam, The Netherlands. 06/2018.
- [Hales60](#), Pittsburgh, PA, USA. 06/2018. (Invited speaker.)

Toward AI for Lean, via metaprogramming

- [AITP 2018: Artificial Intelligence in Theorem Proving](#), Aussois, France. 03/2018.

The Lean theorem prover, for mathematicians

- Western University Mathematics Dept. Foundations Seminar, London, ON, Canada. 12/2017.

An extensible ad hoc interface between Lean and Mathematica

- [ICMS 2018: International Congress on Mathematical Software](#), South Bend, IN, USA. 07/2018.
- [PxTP 2017: Proof eXchange for Theorem Proving](#), Brasília, Brazil. 09/2017.
- [Wolfram Technology Conference](#), Champaign, IL, USA. 10/2016.

Automation and computation in the Lean theorem prover

- [HaTT: Hammers for Type Theory](#), IJCAR, Coimbra, Portugal. 07/2016.
- [AITP 2016: Artificial Intelligence in Theorem Proving](#), Obergurgl, Austria. 04/2016.

- TU München Logic and Verification Seminar, Munich, Germany. 03/2016.

Algebra and analysis in the Lean theorem prover

- [MAP 2016: Effective Analysis](#), Marseille, France. 01/2016.

Dependent types and the algebraic hierarchy

- [Workshop on Mathematics and Computation](#), Newcastle, NSW, Australia. 06/2015.

A heuristic prover for real inequalities

- [ITP 2014: Interactive Theorem Proving](#), Vienna, Austria. 07/2014.
- [6th Podlasie Conference on Mathematics](#), Bialystok, Poland. 07/2014.
- CMU Graduate Research Sharing Forum, Pittsburgh, PA. 12/2013.